What Is Claimed Is:

1. A nucleic acid detection device, comprising:

a solid support having at least one unique addressable area;

at least one probe set, each comprising multiple types of oligonucleotides, each type of oligonucleotide having a determinable sequence, wherein the oligonucleotides are immobilized on at least one surface of the solid support, each probe set being localized in one of the addressable areas.

2. The device as set forth in claim 1, wherein each probe set comprises 2 to 10 types of oligonucleotides having different sequences.

3. The device as set forth in claim 2, wherein each probe set comprises 2 to 4 types of oligonucleotides having different sequences.

4. The device as set forth in claim 1, wherein each oligonucleotide in each probe set is specific to a different target sequence.

5. The device as set forth in claim 1, wherein the length of each oligonucleotide is 4 to 400 bases.

6. The device as set forth in claim 5, wherein the length of each oligonucleotide is 8 to 80 bases.

7. The device as set forth in claim 1, wherein each addressable area is smaller than 1 mm^2.

8. The device as set forth in claim 1, wherein each addressable area is smaller than 0.1 mm^2.

9. The device as set forth in claim 1, wherein each addressable area is smaller than 0.01 mm^2.

10. The device as set forth in claim 1, wherein each addressable area is smaller than 0.0001 mm^2.

11. The device as set forth in claim 1, wherein the density of the probe set on the solid support is greater than 100 probe sets per cm^2.

12. The device as set forth in claim 1, wherein the density of the probe set on the solid support is greater than 1,000 probe sets per cm^2.

13. The device as set forth in claim 1, wherein the density of the probe set on the solid support is greater than 10,000 probe sets per cm^2.

14. The device as set forth in claim 1, wherein the solid support is a plane surface, a curved surface, a tube, a fiber, a microparticle, or a microbead.

15. The device as set forth in claim 1, wherein the solid support is glass, polymer, plastic, metal, silicon, or inorganic materials.

16. The device as set forth in claim 1, wherein the probe set is immobilized on the surface of a gel material applied to the solid support or inside a gel material applied to the solid support.

17. The device as set forth in claim 1, wherein the solid support has a porous structure.

18. The device as set forth in claim 1, wherein the device is a microarray.

19. The device as set forth in claim 1, wherein the oligonucleotides are nucleic acids capable of pairing with DNA.

20. The device as set forth in claim 1, wherein the oligonucleotides are nucleic acids capable of pairing with RNA.

21. The device as set forth in claim 1, wherein the oligonucleotides are DNAs.

22. The device as set forth in claim 1, wherein the oligonucleotides are RNAs.

23. The device as set forth in claim 1, wherein the oligonucleotides are PNAs.

24. The device as set forth in claim 1, wherein each type of the oligonucleotide is synthesized and then immobilized on the solid support.

25. The device as set forth in claim 24, wherein each type of oligonucleotide is immobilized in sequence.

26. The device as set forth in claim 24, wherein each type of oligonucleotide is immobilized simultaneously as a mixture.

27. The device as set forth in claim 1, wherein each type of oligonucleotide is directly synthesized on the solid support.

28. The device as set forth in claim 1, wherein each probe set contains substantially equal quantities of each type of the oligonucleotide.

29. The device as set forth in claim 1, wherein the oligonucleotides of a probe set are evenly distributed across the unique addressable area.

30. The device as set forth in claim 1, wherein the quantity of each type of oligonucleotides corresponds to its affinity to the target sequence.

31. A nucleic acid detection device, comprising:

at least one type of distinguishable microparticle, each distinguishable from other types of microparticles;

at least one probe set, each comprising multiple types of oligonucleotides designed specifically to different target sequences, each type of oligonucleotide having a determinable sequence, wherein the oligonucleotides are immobilized on the microparticles.

32. The device as set forth in claim 31, wherein each type of microparticle carries identification distinguishing it from other types of microparticles, the identification based on particle size, fluorescence signal, radioactive signal, shape, color, or composition of the particle.

33. The device as set forth in claim 31, wherein the particle is glass, polymer, plastic, metal, silicon, or inorganic materials.

34. The device as set forth in claim 31, wherein the probe sets are immobilized on the surface of the microparticles.

35. The device as set forth in claim 31 wherein the microparticles are porous, and the probe sets are immobilized inside the microparticles.

36. The device as set forth in claim 31, wherein the probe sets are immobilized on the surface or inside a gel material applied to the microparticles.

37. The device as set forth in claim 31, wherein each probe set comprises 2 to 10 types of oligonucleotides having different sequences.

38. The device as set forth in claim 37, wherein each probe set comprises 2 to 4 types of oligonucleotides having different sequences.

39. The device as set forth in claim 31, wherein the length of

each oligonucleotide is 4 to 400 bases.

40. The device as set forth in claim 39, wherein the length of each oligonucleotide is 8 to 80 bases.

41. A method for detecting nucleic acid, comprising the following steps:

providing at least one probe set comprising multiple types of oligonucleotides;

providing a solid support having at least one unique addressable area;

attaching the probe set to the unique addressable area of the solid support;

allowing sample nucleic acids to hybridize with probe sets;

labeling the sample nucleic acids with a detectable signal before or after the hybridization; and

determining the results of the hybridization.

42. The method as set forth in claim 41, wherein the labeling of the sample nucleic acids is achieved by performing a technique fluorescence labeling, chemiluminescence labeling, electric signal labeling, and radioactive labeling.

43. The method as set forth in claim 41, wherein each probe set comprises 2 to 10 types of oligonucleotides having different sequences, and each type of oligonucleotide specific to a different target sequence.

44. The method as set forth in claim 43, wherein each probe set comprises 2 to 4 types of oligonucleotides having different

sequences, and each type of oligonucleotide specific to a different target sequence.

45. The method as set forth in claim 41, wherein the length of each oligonucleotide is 4 to 400 bases.

46. The method as set forth in claim 45, wherein the length of each oligonucleotide is 8 to 80 bases.

47. The method as set forth in claim 41, wherein the oligonucleotides are nucleic acids capable of pairing with DNA.

48. The method as set forth in claim 41, wherein the oligonucleotides are nucleic acids capable of pairing with RNA.

49. The method as set forth in claim 41, wherein the oligonucleotides are DNAs.

50. The method as set forth in claim 41, wherein the oligonucleotides are RNAs.

51. The method as set forth in claim 41, wherein the oligonucleotides are PNAs.

52. The method as set forth in claim 41, wherein each probe set contains substantially equal quantities of each type of the oligonucleotides.

53. The method as set forth in claim 41, wherein the oligonucleotides of a probe set are evenly distributed across

the unique addressable area.

54. The method as set forth in claim 41, wherein the quantity of each type of the oligonucleotides corresponds to its affinity to the target sequence.